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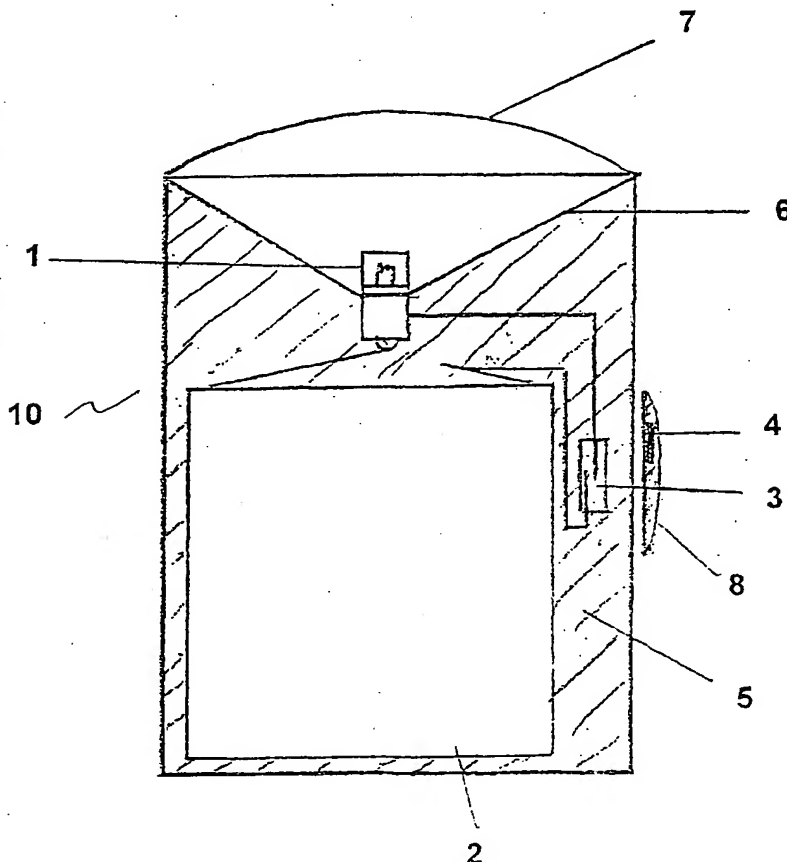
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(54) Title: LAMP



(57) Abstract: A lamp comprises a light source (1), a battery (2) and a switch unit (3) which are electrically interconnected. The lamp's reliability, wear life and corrosion resistance are increased by the switch unit being a magnetic switch (3), which by means of an electrically insulating moulding material is moulded in the same unit as the light source (1) and the battery (2), and which is operated externally by a movable magnet (4).



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Lamp

The invention relates to a battery-powered lamp, and especially a lamp comprising a light source, a battery and a switch unit which are electrically interconnected.

- 5 In more specific terms, the invention relates to disposable lamps for general use. The lamps are hand-held lamps, both chargeable and non-chargeable, and of different sizes.

Ordinary lamps, particularly lamps containing replaceable batteries, light
10 sources or other components, all have in common the problem that they corrode easily and are unreliable over a period of time. This is usually due to the penetration of moisture, resulting in corrosion of contacts between batteries, light source and switch. A result of this corrosion is that the lamp has to be shaken and knocked in order to make it work.

15 US-4 303 970 discloses a lamp of the type mentioned at the beginning, which is made watertight by means of a sealed housing. The lamp also contains an elastic material, such as foam rubber. The material provides electrical and thermal insulation, but contains air, thus leading amongst other things to the risk of condensation being formed inside the lamp. Optimal protection is therefore not obtained against the formation of corrosion in the electrical
20 connections. The lamp contains a mechanical switch which is operated from the outside via sealing means around a control spindle. This represents an additional risk of penetration of air, water and vapour and of the formation of corrosion.

25 An object of the invention is to provide a lamp as mentioned at the beginning, which is reliable, resistant in most environments, watertight, corrosion-resistant, robust, possessing long storage durability, resistant to impact, shock and other physical stresses, and having low production costs.

A special object of the invention is to provide a lamp of this kind which can also be operated from outside by an operating body, where the operating body
30 does not detract from qualities in the lamp such as reliability, resistance, watertightness, corrosion resistance, robustness and storage durability.

A further object is to provide a lamp of this kind which in addition is environmentally friendly, and/or a lamp of this kind which can be included in a return scheme.

The above objects are achieved by means of a lamp as set forth in the patent claims.

The invention will now be described in greater detail with reference to the drawings, in which:

5 fig. 1 is a schematic cross section of a first embodiment of a lamp according to the invention,

fig. 2 is a schematic cross section of a second embodiment of a lamp according to the invention, and

10 fig. 3 is a schematic view from above of a third embodiment of a lamp according to the invention.

Fig. 1 illustrates a cross section of a first embodiment of a substantially rectangular lamp according to the invention. The lamp 10 consists of a light source 1, a battery 2 and a switch unit 3 which are electrically interconnected. All electrical connection points are preferably welded or soldered, thus
15 reducing the risk of corrosion.

The light source 1 is illustrated as an incandescent lamp, but may alternatively be one or more interconnected high intensity light diodes, connected in series with a current limiting pre-resistor which may be integrated in the light diode.

20 All the electrical connections are located in a corrosion-free environment. This is achieved by having the light source 1, the battery 2 and the switch unit 3 all moulded in an electrically insulating moulding material, without the presence of air and/or moisture.

A suitable moulding material is polyethylene. Other examples of suitable moulding materials are polycarbonate, epoxy, polystyrene, silicone and two-
25 component or multicomponent plastic materials.

The switch unit 3 is a sealed magnetic switch or "reed switch". The switch unit 3 is operated externally by an operating body 8 which contains a movable permanent magnet 4. An electrical connection is formed between the switch's two terminals when a magnetic field of sufficient force is created through the
30 switch unit, such as when the magnet 4 is located in the immediate vicinity. In this embodiment the operating body is movably mounted on the outside of the lamp by means of slots or guides on the outside of the lamp's moulded main part.

The lamp also comprises a reflector 6 and a lamp lens 7, both of which are moulded in the same unit as the light source 1, the battery 2 and the switch unit 3.

5 Fig. 2 illustrates in cross section a second embodiment 20 of a substantially cylindrical lamp according to the invention. Identical or corresponding elements are given the same reference numerals as in fig. 1. The battery 2 in this case consists of two cylindrical cells, connected in series.

10 This embodiment 20 corresponds by and large with the embodiment 10 in fig. 1, except for the fact that the movable magnet 4 is attached to a circular ring 8 which is arranged to be rotated round the lamp. The ring 8 has an internal diameter which is slightly larger than the external diameter of the main part of the lamp, thus permitting rotation with a suitable degree of friction. When the ring 8 is rotated to a position where the magnet is located immediately above the magnetic switch 3, the lamp will be switched on. The main part of the lamp
15 is provided with slots (not shown) which are suitable for holding the ring in a fixed axial position while permitting rotating movement.

In a variant of the embodiment in figure 2, the ring 8 is arranged to be moved in a spiral, i.e. with a rotating movement with a simultaneous movement in the lamp's axial direction. This can be achieved by providing the ring with an
20 internal spiral-shaped slot, adapted to fit a fixed raised portion on the outside of the lamp's main part.

Fig. 3 is a schematic view from above of a third embodiment 30 of a miniaturised lamp according to the invention. In this case a button cell is employed for the battery 2, and for the light source 1 a light-emitting diode
25 with integrated pre-resistor. The magnetic switch 3 is operated by a movable operating body (not shown) on the outside of the lamp's moulded main part and containing a magnet (not shown).

In contrast to known lamps which are made watertight solely by means of a tightly enclosing housing, the chances of the formation of corrosion are greatly
30 reduced in the lamp according to the invention, since the moulding material fills all the cavities, thus preventing air, vapour or water from coming into contact with the electrical connection points. This feature, combined with the use of a sealed magnetic switch and a movable magnet arranged for external operation, provide a highly reliable lamp with long storage durability.
35 Furthermore, the lamp provided is extremely robust with regard to influences

from external forces such as impacts and shocks, since the moulding material eliminates play and freedom of movement of the lamp's components.

5 It will be apparent to those skilled in the art that many modifications and variations are possible within the scope of the invention as it is defined by the following patent claims and by their equivalents.

PATENT CLAIMS

1. A lamp, comprising a light source (1), a battery (2) and a switch unit (3) which are electrically interconnected,
characterized in that the switch unit is a magnetic switch (3) which by means
5 of an electrically insulating moulding material (5) is moulded in the same unit
as the light source (1) and the battery (2), and which is operated externally by
a movable magnet (4).
2. A lamp as indicated in claim 1,
characterized in that all electrical connections are located in a corrosion-free
10 environment, since the moulding material (5) fills all the cavities between the
components of the lamp.
3. A lamp as indicated in claim 2,
characterized in that the movable magnet is attached to a ring which can be
rotated round the lamp.
- 15 4. A lamp as indicated in claim 2,
characterized in that the movable magnet is movably mounted on the outside of
the lamp.
5. A lamp as indicated in claim 3 or 4,
characterized in that all electrical connections are welded or soldered.
- 20 6. A lamp as indicated in claim 5,
characterized in that it also comprises a reflector (6) and a lamp lens (7)
moulded in the same unit as the light source, the battery and the switch unit.

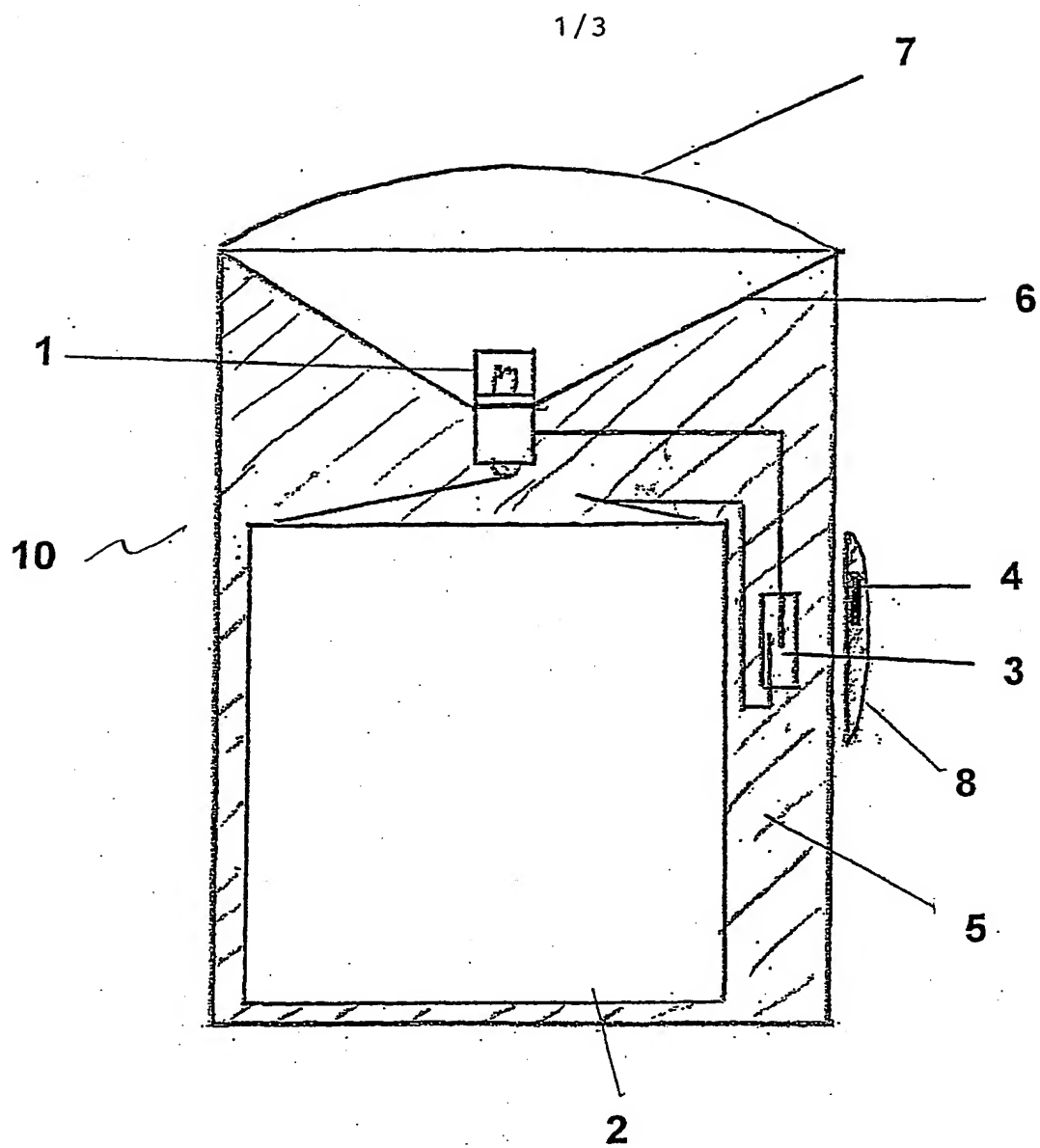


Fig. 1

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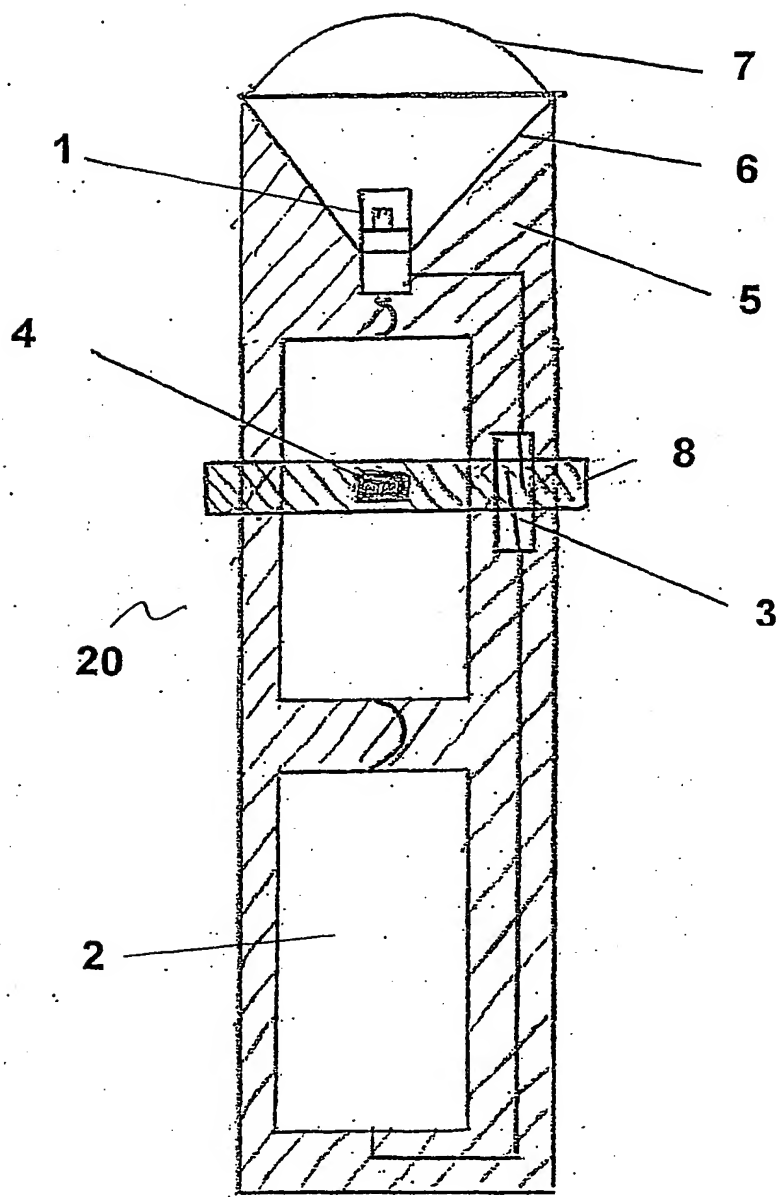


Fig. 2

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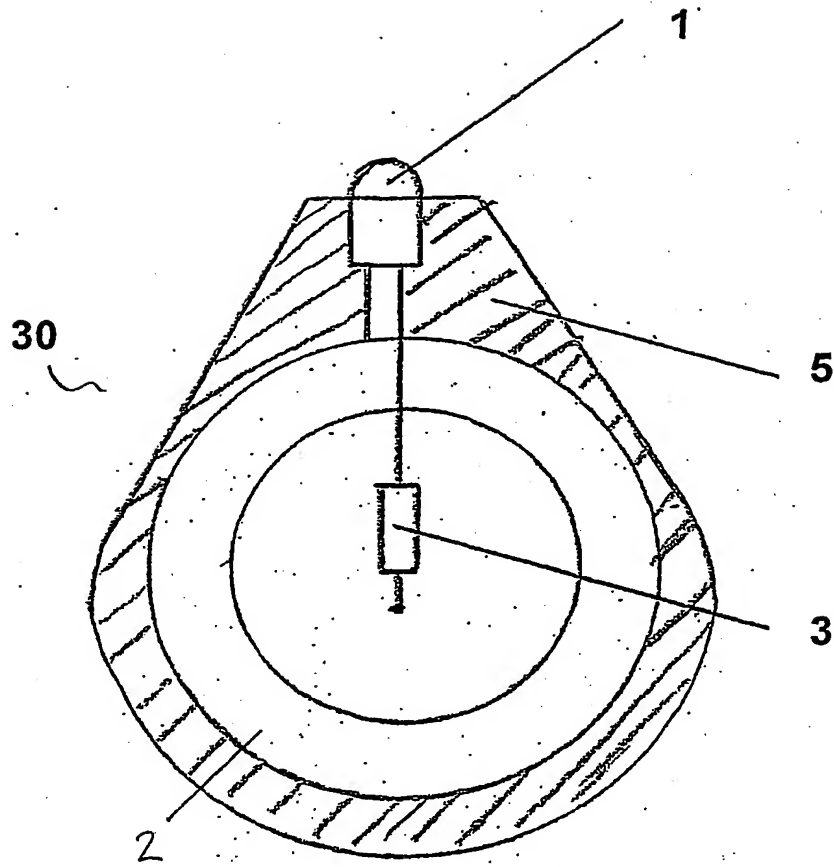


Fig. 3

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A. CLASSIFICATION OF SUBJECT MATTER

IPC7: F21L 4/00 // F21V 31/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI DATA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	GB 2089015 A (TANG CHUEN), 16 June 1982 (16.06.82), figure 5 --	1,2
Y	GB 2090956 A (STROBE-IDENT LIMITED), 21 July 1982 (21.07.82), page 2, line 47 - line 49; page 2, line 65 - line 79 --	1,2,4
Y	US 4303970 A (ROBERTSON), 1 December 1981 (01.12.81), figure 1, abstract --	1,2,4
Y	US 4760504 A (SCHALLER ET AL), 26 July 1988 (26.07.88), figure 2 --	1,2,4

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3162376 A (SYOICHI FURUYA), 22 December 1964 (22.12.64) --	1
A	US 3790912 A (MURPHY), 5 February 1974 (05.02.74) --	1
A	US 3898450 A (KILBY), 5 August 1975 (05.08.75), figure 2 -----	1

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Information on patent family members

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Patent document cited in search report			Publication date	Patent family member(s)	Publication date
GB	2089015	A	16/06/82	NONE	
GB	2090956	A	21/07/82	NONE	
US	4303970	A	01/12/81	NONE	
US	4760504	A	26/07/88	NONE	
US	3162376	A	22/12/64	NONE	
US	3790912	A	05/02/74	US 3792389 A	12/02/74
US	3898450	A	05/08/75	NONE	